1923

U. S. DEPARTMENT OF AGRICULTURE

FARMERS' BULLETIN No. 1058

DESTROY THE COMMON BARBERRY

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BLACK STEM RUST of wheat and other grains destroys millions of bushels of grain every year. In the years when rust epidemics were widespread, as in 1904 and 1916, the losses ran up into hundreds of millions of dollars.

The common barberry (*Berberis vulgaris*) carries the spring stage of the black stem rust. In the northern United States the rust can not get started in the spring without the aid of the barberry.

The statements made in this bulletin apply in general to the grain-growing sections of the northern half of the United States east of the Rocky Mountains.

The United States Department of Agriculture is cooperating with 13 States in the upper Mississippi Valley in locating and eradicating all bushes of the common barberry. All of these States have laws requiring the destruction of this bush.

The common barberry should be dug and burned wherever it is found. All the roots should be taken out when digging the bush. If any are left in the ground, sprouts will come up from them. Seeds dropped beneath the bush will germinate readily in the loose soil where the bush was dug, and a crop of seedlings may result.

For several years the spot where a bush once stood should be watched and any new sprouts or seedlings should be dug promptly.

The Japanese barberry (*Berberis thunbergii*) does not rust and need not be destroyed. It is a beautiful bush of a graceful spreading habit and may be planted wherever desired.

Destroy the common barberry and save the grain.

Washington, D. C. Issued May, 1919: revised February, 1923.

DESTROY THE COMMON BARBERRY.

E. C. STAKMAN, *Pathologist and Agent, Office of Cereal Investigations, Bureau of Plant Industry.*

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LOSS CAUSED BY THE BARBERRY.

EVERY COMMON BARBERRY BUSH in the grain-growing sections of the northern United States should be destroyed immediately. The bush is a serious danger to grainfields, because it carries and spreads the dreaded black stem rust of wheat, oats, barley, rye, and wild grasses. This disease destroys millions of bushels of grain every year. In 1916 the black rust was the principal cause which reduced the yield of wheat in Minnesota, North Dakota, South Dakota, and Montana by over 200,000,000 bushels and in Canada by 100,000,000 bushels. Careful estimates place the money loss in the United States in 1916 at nearly $200,000,000. The average loss during the 5-year period, 1916 to 1920, inclusive, was approximately 65,000,000 bushels of wheat each year.

The common barberry is the means of spreading this terrible scourge of grainfields. It becomes infected with the rust in the spring and the rust then spreads from the bushes either directly to grainfields or first to wild grasses and then from the grasses to the grain. Every common barberry bush must be destroyed immediately therefore in order to protect our grain crops.

KILL THE BARBERRY NOW.

Now is the time to dig barberry bushes. Increase the yield this year by reducing rust damage. The longer the bushes remain in the ground the greater the menace to grain crops. Rust usually develops on the barberries most abundantly in the spring, but may continue to develop on them throughout the growing season. The bushes, therefore, not only start the rust in the spring, but they also may continue to spread it all summer. Every barberry bush destroyed in the northern grain-growing sections means more grain.

THE BARBERRY DANGEROUS WHEREVER IT IS.

Barberry bushes and hedges in villages and cities can damage distant grainfields. The rust is spread by the wind and can be blown long distances. City dwellers who have planted the common barberry can assist in protecting fields of wheat and preventing crop losses by removing their bushes. It has often been observed that barberry bushes in large cities spread rust, first to grasses near by and then onward to grainfields several miles distant. Execute this

FIG. 1.—A bush of the common barberry, showing its tall erect growth. (Compare with Fig. 8.)

criminal bush wherever it is, because it often works secretly far from its victims, the grainfields and the grain growers. (Fig. 1.)

THE COMMON BARBERRY AN OUTLAW.

The destruction of the common barberry bush is especially vital in the most important grain-growing districts. Its eradication is now required by law in all 13 States in the eradication area, viz: Colorado, Illinois, Indiana, Iowa, Michigan, Minnesota, Montana,

Nebraska, North Dakota, Ohio, South Dakota, Wisconsin, and Wyoming. Even prior to the enactment of these legal requirements, owners of bushes, realizing the damage which they are capable of doing, expressed their preference for good crops rather than for a bush which can be replaced by harmless and more beautiful shrubbery.

To prevent the shipment of harmful barberries and mahonias into States where the eradication campaign is in progress, the United States Department of Agriculture established a quarantine, effective on and after May 1, 1919. This quarantine prohibits the shipment of several species and varieties [1] from any State outside the eradication area into any of the States within that area—Colorado, Illinois, Indiana, Iowa, Michigan, Minnesota, Montana, Nebraska, North Dakota, Ohio, South Dakota, Wisconsin, and Wyoming.

For hundreds of years practical farmers have known that the common barberry develops black stem rust, and for 50 years scientists have known how it does this. Even as early as 1660, local laws were passed against the barberry in France. Many laws designed to eradicate the barberry were enacted in European countries, and several American Colonies passed similar laws about 1750. A barberry-eradication law has been on the statute books of Ontario for several years. Denmark eradicated the barberry and prevented the black stem rust. The relation between barberry and rust, then, is a long-established and unquestioned fact, as hundreds of farmers will testify who have noticed the effect of the bushes on their grainfields.

HOW DENMARK PREVENTED RUST EPIDEMICS.

Denmark proved conclusively the value of barberry eradication and by destroying the rust-producing species, as required by the law of 1903, stopped all serious outbreaks of black stem rust. Previous to the removal of barberry bushes there had been periodic destructive rust epidemics, but since that time there has not been a single serious outbreak in Denmark. In the United States, however, during the same period there have been two terrific epidemics causing enormous losses, the last one occurring in 1916, when every bushel of grain was vitally important. There also have been smaller but destructive epidemics in 1919, 1920, and 1921. Not a year passes in which the black stem rust does not destroy several millions of bushels of wheat and other grains.

THE EVIDENCE AGAINST THE BARBERRY CONCLUSIVE.

The guilt of the common barberry has long been established beyond any doubt. It gives the rust its start in the spring. Without the barberry the rust is practically powerless to spread to grains and grasses. The reason for this is that there are three different stages the rust during the year. The black-spore stage, or winter stage, of the rust lives during the winter on grain stubble and wild grasses.

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[1] The following species and varieties are covered by this quarantine: *Berberis actnensis, B. altaica, B. amurensis, B. aristata, B. asiatica, B. atropurpurea, B. brachybotrys, B. brevipaniculata, B. buxifolia, B. canadensis, B. carioliniana* (*carolina*), *B. coriaria, B. crctica, B. declinata, B. fendleri B. fischeri, B. fremontii, B. hctcropoda, B. dicifolia, B. integerrima, B. laxiflora, B. lycium, B. macrophylla, B. nepalensis, B. neuberti, B. sibirica, B. sieboldii, B. sinensis, B. trifoliolata, B. umbellata,* and *B. vulgaris,* including subspecies and horticultural varieties.

Mahonia aquifolium, M. diversifolia, M. glauca, and *M. repens.* The quarantine on *Mahonia repens* was removed, effective January 1, 1923.

It can not spread directly to grains or grasses, but must spread first to the common barberry to get its start in the spring.

The black rust spots on stubble and straw consist of large numbers of minute black spores (seeds). These spores germinate early in the spring, producing smaller spores which are blown about by the wind. These smaller spores are entirely harmless unless they fall on barberry leaves, because they can not start rust on grains. When they fall on barberries, however, they cause the spring stage, or cluster-cup stage, of the rust on the leaves and other tender parts of the bushes. The cluster cups are filled with immense numbers of spring or cluster-cup spores. These spores can not spread rust from one barberry bush to another, but are blown to grains and grasses and cause the red-spore stage, or summer stage, of the rust. Within a

FIG. 2.—Common barberry bushes escaped from cultivation in a woodland pasture on a farm in Wisconsin.

week or 10 days from the time when they fall on the grain or grass plants the red rust appears.

The red or summer stage of stem rust is familiar to most farmers as the long reddish brown spots on various parts of the grain plants. The red spots (pustules) are composed of enormous numbers of the red or summer spores of the black rust. These spores are in turn blown about by the wind and infect other near-by grains and grasses. In this way a new crop of the red spores is produced every week or ten days during the growing season if conditions are favorable for the spread of the rust. Late in the season the red stage is replaced by the black or winter stage, and the rust overwinters again in this form on stubble, straw, and grasses. The next spring it again has to depend upon the barberry to get started. The removal of the common barberry, therefore, deprives the rust of its principal ally and checks

its spread. Every time a barberry bush is removed one of the props is knocked out from under the rust.

DON'T LET THE COMMON BARBERRY RUN WILD.

The common barberry has "run wild," or escaped from cultivation (Figs. 2, 3, 4, and 5). It was planted widely as an ornamental shrub in cities, villages, and rural districts. It was distributed all over the country by nurserymen before it was realized

FIG. 3.—Map showing large numbers of escaped barberries (small dots) in 1921 developed from seeds scattered by birds from a barberry hedge (large black square) on a farm in Dekalb County, Ind.

how destructive it is. Since the nurserymen have learned about the effects of the bush they have taken the lead not only in destroying their own but in assisting in the destruction of other bushes. During the early part of the barberry-eradication campaign nurserymen destroyed over 1,000,000 bushes. The larger estimated numbers are about 600,000 in Minnesota, 500,000 in Iowa, 200,000 in Wisconsin, and 75,000 in Ohio. Practically all nurserymen of the United States have stopped propagating any harmful kinds of barberry.

Unfortunately the common barberry has escaped widely from cultivation in the grain-growing areas of the northern United States. Bushes planted 60 to 75 years ago for ornament, hedges, or jelly making have been bearing abundant crops of berries for 50 years or more. Many kinds of birds feed commonly on these berries, at least during winters when other food is scarce, and seeds have been scattered widely wherever these birds make their homes. This has resulted literally in hundreds of thousands and even millions of escaped bushes, especially where trees or timber attract the birds. These escaped bushes now are found along fence rows, in orchards, in brushy or timbered pastures, along stream banks,

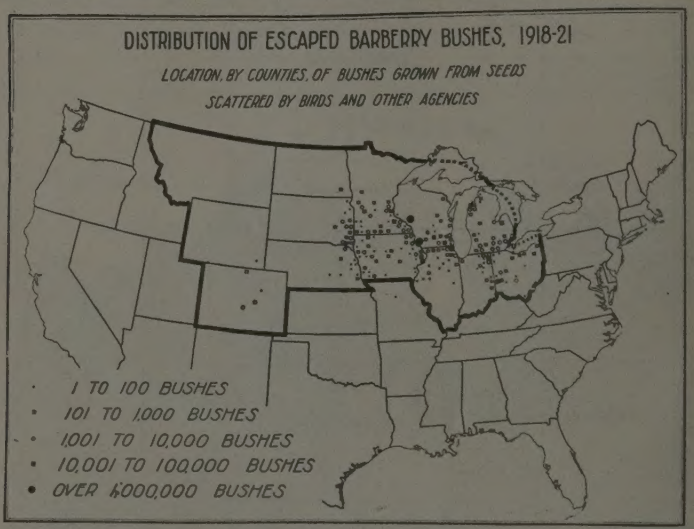
DISTRIBUTION OF ESCAPED BARBERRY BUSHES, 1918-21
LOCATION, BY COUNTIES, OF BUSHES GROWN FROM SEEDS
SCATTERED BY BIRDS AND OTHER AGENCIES
1 TO 100 BUSHES
101 TO 1,000 BUSHES
1,001 TO 10,000 BUSHES
10,001 TO 100,000 BUSHES
OVER 1,000,000 BUSHES

FIG. 4.—Outline map of the United States, showing the distribution, by counties, of escaped barberries which have grown from seeds scattered by birds or other agencies in the 13 States in the barberry-eradication area.

and in open woodland. Their general distribution and abundance are shown on the map (Fig. 4). Escaped bushes in typical locations are shown in Figures 2 and 5. Many of these bushes are close to grainfields, as in Figure 5, in a position to do their deadly work at close range.

An amazing number of escaped bushes already has been found in these 13 States. At the end of 1922 the numbers found were 1 in Wyoming, 42 in Montana, 150 in North Dakota, 2,415 in Colorado, 5,221 in Nebraska, 8,074 in Indiana, 16,179 in South Dakota, 20,627 in Ohio, 27,463 in Illinois, 50,966 in Iowa, 75,496 in Minnesota, 154,477 in Michigan, and 3,067,439 in Wisconsin. The enormous numbers in Wisconsin doubtless are due to the large areas of rough timbered land and the early settlement of the State.

The eradication of escaped bushes in wooded or rocky areas is very difficult, because the roots of the barberry bushes are intertwined with the roots of shrubs and trees or have penetrated into

crevices of the rocks. In either case, not all the roots can be removed, and the remaining portions sprout promptly and abundantly. Chemical methods of destroying these bushes are being used successfully.

The scattering of seeds by birds, animals, water, and other agencies still is going on in increasing quantity, as the numbers of these escaped bushes increase in areas not yet cleaned. If this spread is not checked at once we shall probably be growing barberries and black stem rust but very little wheat within comparatively few years. Dig the barberry now, thus protecting the present grain crops and insuring those of the future.

DIG THE BUSHES BY THE ROOTS.

Dig out the bushes completely. Eradication means complete removal. When digging the bushes, be sure to get all of the roots. If pieces of the roots are left in the ground, young sprouts may grow from them. These sprouts are especially susceptible to rust.

FIG. 5.—Clump of escaped common barberry bushes in a pasture near a grainfield in Wisconsin.

Watch for several years the places from which the bushes have been removed and destroy any sprouts which may appear. The eradication must be complete and thorough or the barberry problem will again arise within a few years. A thorough job now means protection for the future.

THE JAPANESE BARBERRY HARMLESS.

The Japanese or dwarf barberry (*Berberis thunbergii*) does not rust. It is entirely harmless and should not be disturbed. This is very fortunate, because it is a beautiful bush which can be used to replace the common barberry to a considerable extent. (See Fig. 8.)

HOW TO DISTINGUISH THE TWO KINDS OF BARBERRY.

The harmful common barberry (*Berberis vulgaris*) can easily be distinguished from the harmless Japanese barberry by comparing Figures 1, 6, 7, and 8. It is a tall, erect, spiny shrub, often as much

as 10 to 12 feet high (Fig. 1). The most striking differences besides the height are shown in Figures 6 and 7. The leaves of the common barberry are green or purple in color and have saw-tooth edges. The spines are usually in groups of three or more. The yellow flowers are small and seldom noticed, but the red berries, which are

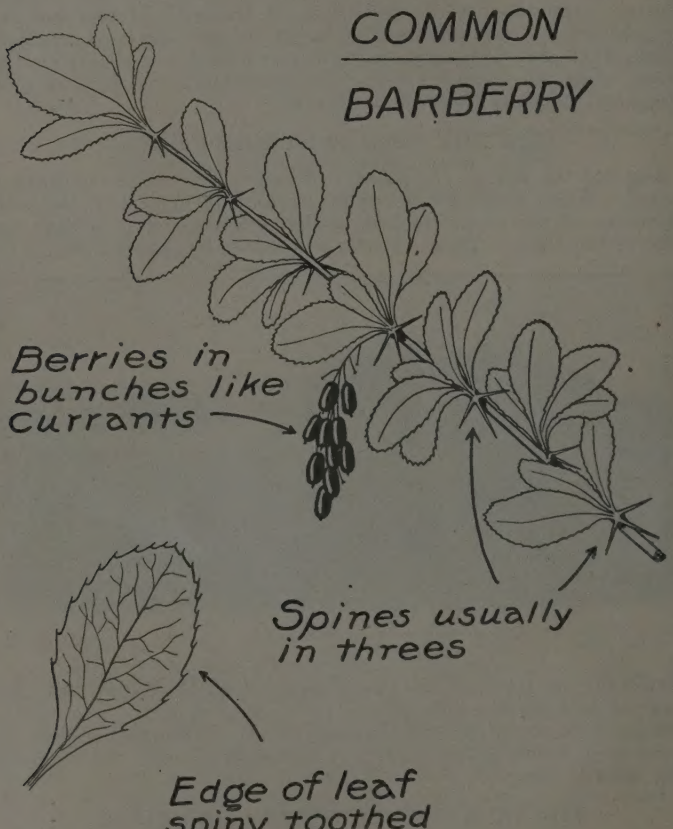

FIG. 6.—A twig of common barberry, showing the larger leaves with toothed edges, the spines on the stems usually in threes, and the berries in long drooping bunches, like currants. (Compare with the Japanese barberry, Fig. 7.)

borne in long clusters, like currants, are quite conspicuous. The bark is grayish. The purple barberry is only a variety of the common form and rusts just as badly as the green-leaved bush. Several other species and varieties of barberry also carry rust. Those which resemble the common barberry in appearance should be destroyed.

The harmless Japanese barberry is a beautiful, low, spreading bush. (Fig. 8.) It is smaller than the common barberry, being usually 2

or 3 feet tall and seldom more than 4 or 5 feet. The leaves, spines, and berries are shown in Figure 7. The leaves are small and have smooth edges. The spines usually are single, although sometimes there are two or even three in a place. The flowers usually are yellowish in color. The red berries are borne singly or in small

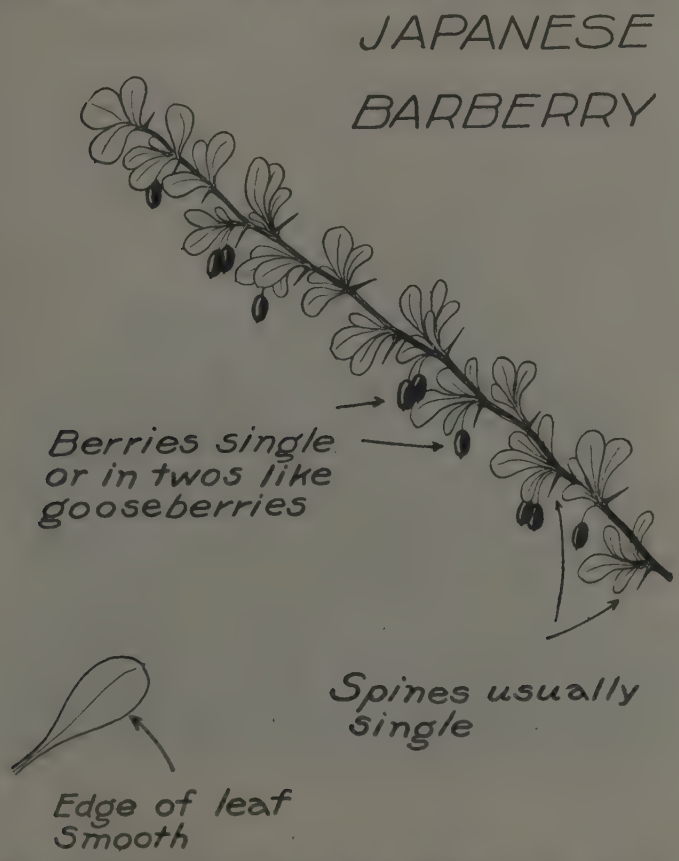

FIG. 7.—A twig of Japanese barberry, showing its smaller leaves with no teeth on the edges, the spines on the stem usually one or sometimes two in a place, and the berries singly or in small and short clusters of two, like gooseberries. (Compare with the common barberry, Fig. 6.)

clusters of two or three, like gooseberries. The bark of the Japanese form usually is reddish in color.

Mahonia, or Oregon grape, is closely related to the barberry. There are two common species. One, the tall mahonia (*Mahonia* (*Berberis*) *aquifolium*), is wild in the Northwestern States west of the Rocky Mountains but not in the barberry-eradication area. It does not rust to any extent where it is wild, but it is sometimes planted as an ornamental shrub in the East and may then rust slightly. It should

not be planted. The small trailing form (*Mahonia* (*Berberis*) *repens*) is a very common wild shrub in the Rocky Mountain region in general. It occurs in the Black Hills of South Dakota, in western Nebraska, and in Montana, Wyoming, and Colorado, in the barberry-eradication area. The black stem rust, however, does not develop on it, and it can therefore be ignored.

PROGRESS OF BARBERRY ERADICATION.

The campaign for the eradication of the common barberry in cooperation with the 13 North-Central States, namely, Colorado, Illinois, Indiana, Iowa, Michigan, Minnesota, Montana, Nebraska, North

FIG. 8.—A clump of Japanese barberry, showing the lower and more spreading habit of this beautiful shrub. (Compare with Fig. 1.)

Dakota, Ohio, South Dakota, Wisconsin, and Wyoming, was organized in February and March, 1918, by the Office of Cereal Investigations of the Bureau of Plant Industry, United States Department of Agriculture. (Fig. 9.)

A Federal quarantine was placed, effective May 1, 1919, prohibiting the movement into the eradication area of any barberries known to harbor black stem rust of wheat and other grains. All of these States have enacted legislation requiring the removal of common barberry bushes.

The campaign has developed three different phases—education, eradication, and investigation.

Education comprises the distribution of literature, including posters, bulletins, circulars, form letters, post cards, cartoons, and similar educational matter; the preparation of articles for State and county newspapers and farm journals; the giving of talks in schools, at meetings of farmers' organizations, and other public assemblies; demonstrations at county and State fairs and on infested farms; and the circulation of motion-picture reels.

Eradication comprises a survey of every property within the entire area to locate bushes of the common barberry and to see that the bushes are eradicated. Repeated resurveys are conducted to see that all sprouts and seedlings which continue to develop are destroyed.

During the period from April 1, 1918, to December 31, 1922, almost all cities, towns, and villages in the entire 13 States of the eradication area were surveyed. The original survey was completed in Montana, Colorado, and Wyoming and a resurvey conducted in these States for finding and eradicating sprouts and seedlings appearing since the original survey was completed. The survey is being carried forward rapidly, farm by farm and county by county, in the other 10 States. In the farm-to-farm survey approximately 472 counties have been covered. A resurvey of every property on which barberries were found is being carried on, and areas in the vicinity of large hedges or large bushes, either cultivated or escaped, which were old enough to bear seeds when found were designated for a more careful survey. A grand total of 5,829,368 bushes has been located on 55,844 properties. Of these 3,428,550 were escaped bushes on 3,192 properties. A total of 5,173,547 bushes has been removed from 51,992 properties. Of the 655,821 bushes remaining on 3,852 properties, the greater number are in a few large escaped areas in Wisconsin, Illinois, and Michigan. These areas can not be cleared immediately because of their extent and the difficulty of eradication.

Investigation includes studies of the time, rate, and manner of the spread of rust from barberries, the time, rate, and method of development of seedlings and sprouts, and the best times and chemical and mechanical methods of destroying bushes of different ages and locations.

HELP!

If you saw an anarchist with a blazing torch in his hand sneaking through the grass to your ripe wheat field, intending to set it on fire, what would you do? If you saw several of his companions in crime sneaking to your granary with oil and matches, what would you do? If you saw a mob of wild-eyed anarchists running amuck with firebrands and destructive intent, what would you do? You would shoot the first, you would shoot as many of the small group as you could, and you would call for help to exterminate the whole breed.

The common barberry is a red-handed anarchist bush. It has a long career of crime behind it. It has a longer and more terrible career of crime before it if we don't put a stop to it. It has destroyed billions of bushels of wheat and other grains in the past. It will destroy billions of bushels in the future unless we destroy it. Denmark destroyed the common barberry and stopped the stem rust. Many farmers in this country have destroyed their own bushes and rescued their crops from ruin by the rust.

The United States Department of Agriculture and the grain-growing States are eradicating the common barberry. Are you for it or against it? We can not save the wheat and keep the barberry.

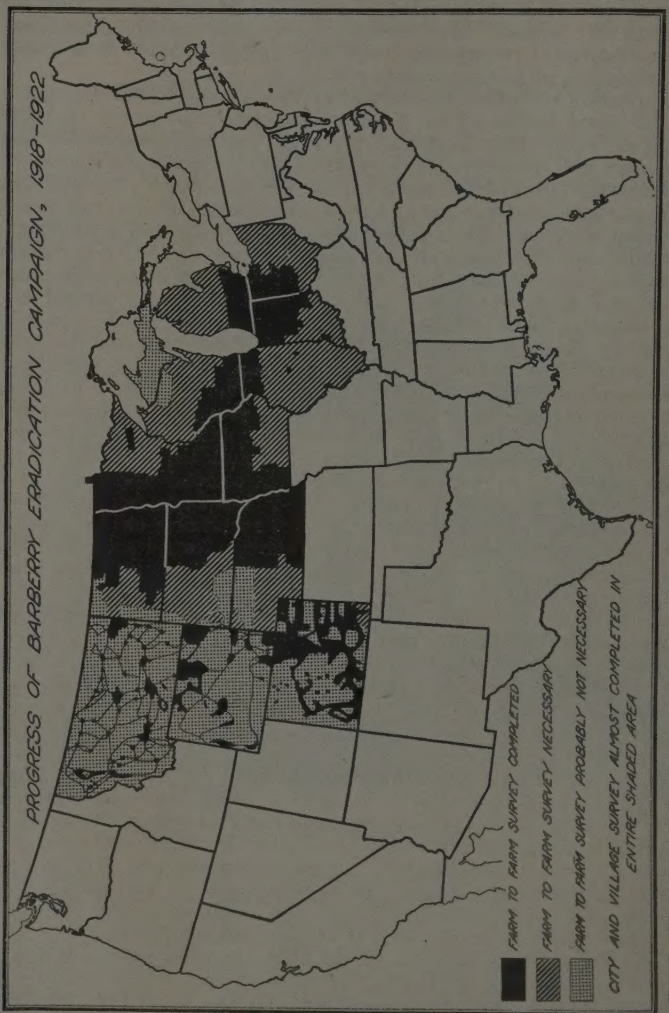
PROGRESS OF BARBERRY ERADICATION CAMPAIGN, 1918-1922
FARM TO FARM SURVEY COMPLETED
FARM TO FARM SURVEY NECESSARY
FARM TO FARM SURVEY PROBABLY NOT NECESSARY
CITY AND VILLAGE SURVEY ALMOST COMPLETED IN ENTIRE SHADED AREA

FIG. 9.—Map of the United States, showing the progress made in the eradication of the common barberry in the five years from 1918 to 1922, inclusive, in the 13 North-Central States comprising the barberry eradication area.

The wheat is valuable and needed; give it a chance! The common barberry is not valuable and can be replaced by the beautiful Japanese barberry.

DESTROY THE COMMON BARBERRY!

LIFE STORY OF THE BLACK STEM RUST OF WHEAT AND OTHER GRAINS

SPRING: Rust develops on the barberry in the spring

SUMMER: The red stage spreads on grains and grasses

AUTUMN: The black stage follows the red stage

WINTER: The black stage winters on stubble and grasses. Goes only to barberry

The common barberry carries and spreads black stem rust of wheat, oats, barley, and rye

The Japanese barberry is harmless

Destroy
The Common Barberry

For further information write to your
STATE COLLEGE OF AGRICULTURE
or the
U. S. DEPARTMENT OF AGRICULTURE

▼

PUBLICATIONS OF THE UNITED STATES DEPARTMENT OF AGRICULTURE RELATING TO GRAIN RUSTS.

AVAILABLE FOR FREE DISTRIBUTION BY THE DEPARTMENT.

The Black Stem Rust and the Barberry. (Yearbook Separate 796.)
Progress of Barberry Eradication. (Department Circular 188.)
Rust Resistance in Winter-Wheat Varieties. (Departemnt Bulletin 1046.)

FOR SALE BY THE SUPERINTENDENT OF DOCUMENTS, GOVERNMENT PRINTING OFFICE, WASHINGTON, D. C.

Investigations of Rusts. (Bureau of Plant Industry Bulletin 63.) Price, 10 cents.
The Rusts of Grains in the United States. (Bureau of Plant Industry Bulletin 216.) Price, 15 cents.
Lessons from the Grain-Rust Epidemic of 1904. (Farmers' Bulletin 219.) Price, 5 cents.

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